

AMENDMENTS TO SPECIFICATION

♦ Headers

Please insert the following headers into the specification at the indicated locations:

Page 1, line 3 (after the title):

-BACKGROUND OF THE INVENTION

1. Field of the Invention-.

Page 1, between lines 7 and 8:

-2. Description of Related Art-.

Page 3, between lines 18 and 19:

-SUMMARY OF THE INVENTION-.

Page 4, between lines 6 and 7:

-BRIEF DESCRIPTION OF THE DRAWINGS-.

Page 5, between lines 3 and 4:

-DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS-.

♦ Other Changes to the Specification

Please amend the following paragraphs of the specification:

Page 3, lines 27-29, delete in their entirety.

Page 7, line 31 to Page 8, line 3:

By way of a quantitative indication, if wire 5 has a diameter $w_{strip} = 0.1$ mm, w_{lo} could be 0.4 mm and w_{hi} could be 2 mm. For a measurement under such conditions, the width $[[w_0]]$ of collimated beam 2¹ could be 4 mm.

Page 8, lines 15-25:

As is known, the definition of the integral-sinus function is:

$$\text{Si}(x) = \int_0^x \frac{\sin y}{y} dy$$

The comprehensive mathematical expression of the field distribution onto detector 10 given by:

$$\underline{E'E} = \underline{E_0} \exp(-j2k_0(f_1 + f_2)) \exp(j\pi/2) \sqrt{f_1/f_2} \left\{ \text{Si}\left(\frac{2\pi w_{lo}}{lf_2} \left(x + \frac{f_2}{f_1} \frac{w_{strip}}{2}\right)\right) - \text{Si}\left(\frac{2\pi w_{hi}}{lf_2} \left(x + \frac{f_2}{f_1} \frac{w_{strip}}{2}\right)\right) - \text{Si}\left(\frac{2\pi w_{lo}}{lf_2} \left(x - \frac{f_2}{f_1} \frac{w_{strip}}{2}\right)\right) + \text{Si}\left(\frac{2\pi w_{hi}}{lf_2} \left(x - \frac{f_2}{f_1} \frac{w_{strip}}{2}\right)\right) \right\}$$

A mathematical modelling analysis of the optical system behaviour reveals that field distribution detector 10 is a continuous function, more particularly a sum of four integral-sinus functions, the field intensity or square of the above field distribution function being plotted in Fig. 5a. Two of

them the four integral-sinus functions become zero at point $x = -\frac{f_2}{f_1} \frac{w_{strip}}{2}$ (and hence they are

associated with a first edge of object 5), and the other two are identical to the first two functions

but have opposite sign and become zero at point $x = +\frac{f_2}{f_1} \frac{w_{strip}}{2}$ (and hence they are associated

with the second edge). The two functions of each pair have relative maxima and minima oscillating at different frequencies, which are inversely proportional to constructional dimensions w_{lo} and w_{hi} of filter 8.

Page 14, line 25 to page 15, line 6:

Turning again to the band-pass filter 8 shown in Figs. 4a and 4b, experimental tests have shown that a good identification of the edges is achieved if ratio w_{hi}/w_{lo} between width

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w_{hi} of transparent window 8" and width w_{lo} of opaque element 8' meets the condition [[2,5]]
2.5 ≤ w_{hi}/w_{lo} ≤ 7. Furthermore, if the values of w_{hi}/w_{lo} are odd integer numbers, the amplitudes of the secondary oscillation maxima in the field distribution are minimized and introduction of spurious spatial frequencies is avoided, as it can clearly be deduced from the mathematical analysis. If moreover $w_{hi}/w_{lo} \leq 5$, the main lobes of the twin-peak signal do not exhibit relative maxima and minima that could deceive the detection process. Thus, in the preferred embodiments, w_{hi}/w_{lo} could be 3 or 5. Figs. 5 to 7 refer to the case $w_{hi}/w_{lo} = 5$.